CHAPTER 5

NCEES EXAMINATION PASS RATES

Pass rates on NCEES examinations in California and the comparison states were obtained and described over a five-year period (1997 to 2001). In addition to the Fundamentals of Engineering (FE) exam, results were obtained for the following engineering disciplines: agriculture, chemical, civil and its five depth exams, control systems, electrical, fire protection, industrial, manufacturing, mechanical and its three depth exams, metallurgical, nuclear and petroleum. Since the focus of the analysis is on relative differences in pass rates between individual states, standard normal scores (z-scores) have been computed to describe each state's distance from the weighted pass rate for the ten states combined.[1] The higher the z-score the further a state's pass rate is from the rate for the combined states. A negative value indicates a lower pass rate than average while a positive value indicates a higher one. Actual pass rates are not shown in the report. Each comparison state has been assigned a code letter so that their identity is masked.

Fundamentals of Engineering Examination

Some states are consistently above average in their pass rates on the FE exam, while others are consistently below. Four states have above average pass rates (states I, J, K, and G), while three states have below average pass rates (California, and states F and E). With the exception of 1997, state D has a modestly above average pass rate, while, with the exception of 2001, state H has a below average rate. California's pass rate was at least nine standard deviations below the mean for the ten states in each of the five years, far and away the lowest among the comparison states. States G, K, and J were generally nine standard deviations or more above the mean. States H, E, and D were usually closest to the mean. (Table 5.1)

Reasons for this pattern are unclear. The quality of education in the respective states would be the most obvious hypothesis. States could also vary in screening those applying to take the fundamentals exam. They may also vary in the proportion of candidates educated abroad so that language facility and the focus of education play a role in states like California with a larger immigrant population.

In a search for other explanations, a relationship between pass rates and regulatory structure was explored. Although two different methodologies were used to test this difference, each gave the same answer: pass rates are higher in "board-dominated" states and lower in "agency-dominated" ones. The first methodology computed the average distance from the overall mean pass rate on the FE exam for board and agency states. The total taking the exam in the four board states was divided into the number passing to obtain a "weighted" pass rate, giving greater weight to the states with more examinees. Using weighted figures, pass rates are close to the average in the four "board-dominated" states -- despite California's well below average scores -- and significantly below average in the six "agency-dominated" states in two of the five years (1997 and 2000). Using an unweighted average of the normalized pass rates for each group of states, pass rates are well above average in the board-dominated states (with z-scores of 2 to 4.18 standard deviations above the mean) and well below or close to the mean in the agency-dominated states (-5.47 to .81). (Table 5.2a)

[1] Examination scores for state B were not available. Results for state A were only available for 2000 and 2001.

Pass rates were also compared for discipline-based and generic licensing states. Even stronger differences were found between these two groups of states, again independent of the methodology used. In three of the five years, this is a comparison of California with the eight generic licensing states. Exam data was only available for state A for 2000 and 2001. Using weighted or unweighted average standardized pass rates, California and state A are many standard deviations (-8.71 to -17.61) below the average pass rate for the comparison states while the generic licensing states are significantly above average (ranging from 1997 lows and 2001 highs of 6.30 to 14.84 standard deviations for weighted data and from 2.6 to 5.08 standard deviations for unweighted data). (Table 5.2b)

Civil Engineering Examination

California. In California, the fundamentals and civil exams appear to work as screening devices for those seeking licensing. Although California pass rates on the general civil exam are not as low as they are on the fundamentals exam, they are still significantly below average, varying between three and nine standard deviations below the mean for the ten states. A similar pattern is observed on the transportation depth exam that began in 2000 and to a lesser extent on the water resources depth exam that began in the same year. On all other civil depth exams -- and indeed, almost all other specialty exams -- California pass rates are very close to the average. California requires that civil engineers pass an additional exam in order to become licensed that tests knowledge of seismic principles and surveying. Because the examinees in California are preparing for this additional exam in conjunction with their preparation for the NCEES civil exam, their scores may be negatively affected. (Table 5.1, 3, 4, 4a and 4b)

Comparison states. On the civil exam, states E and F continue the pattern of lower than average pass rates established on the fundamentals exam while states I, J, and K continue to have significantly higher ones. State H is the only state to reverse directions. While pass rates were below average on the fundamentals exam, they were consistently above average on the civil exam. (Table 5.4)

On the transportation, water resources and structural depth exams, states E and F are right at the average for the six comparison states giving those exams in 2000 and 2001. State I in both years, and states J and H in 2001, had significantly higher pass rates on the transportation and water resources exams. Only states I and J exceeded the average on the structural depth exam in 2001 and only state H and J exceeded it on the geotechnical depth exam in the same year. State E's lower than average pass rate resurfaced on the geotechnical depth exam. None of the states varied much from the average on the environmental depth exam. (Table 5.4a, b, c, d and e)

Mechanical Engineering Examination

California. The HVAC and refrigeration depth exam was one of the exceptions to the general observation that California pass rates on the specialty exams were in the normal range. On this exam, the pass rate was two standard deviations below the average for seven states. However, California was close to the average for the comparison states on the overall exam in mechanical engineering. (Table 5.5 and 6)

Comparison states. States E and F are also significantly below average on pass rates for the mechanical engineering examination. States I, J and K in three of the five years, continued to have above average pass rates. States D and H, along with California, were close to the average in all five years. State H was also above average in its pass rate on the HVAC and

refrigeration depth exam, while state I was somewhat above on machine design and state E somewhat below on thermal and fluids systems. With these few exceptions, the states' performance on the mechanical depth exams was very consistent. (Table 5.5)

Electrical Engineering Examination

California and its comparison states The other major exception to California's generally average pass rates on the specialty exams was its performance on the electrical engineering exam. Pass rates on this exam were significantly below average in four of the five years surveyed. State E was below average in three of the five years while states J and K were above average in four and five years respectively. States F and H were consistently close to the mean. (Table 5.7)

Chemical Engineering Examination

California and its comparison states. California was significantly below average in only one of the four years (2000). Most states varied closely around the mean, with occasional pass rates veering off in a positive (state J) or negative (states E and F) direction. Only state K was consistently above average in its pass rates on the chemical engineering examination in all five years. (Table 5.8)

Control Systems Examination

California and its comparison states. Pass rates for all states varied within a narrow range on the control systems examination, with only states H and J significantly below average in 1998. The number taking the exam in both states, however, was extremely small (3 and 6 respectively). (Table 5.9)

Fire Protection Examination

California and its comparison states. Pass rates were very consistent over all states and years. State E had modestly lower pass rates in 1998 and 2000, while state A had a modestly higher one in 2000. (Table 5.10)

Industrial Examination

California and its comparison states. Neither California nor its comparison states varied much from the average in any of the five years. (Table 5.11)

Petroleum Examination

California and its comparison states. In 1999, California had a modestly lower than average pass rate on the petroleum exam, while in the same year state K had a somewhat higher than average rate. Many states, however, did not administer this exam and those that did had few examinees. (Table 5.12)

Metallurgical, Nuclear, Agricultural and Manufacturing Examinations

California and its comparison states. Since very few take these exams, pass rates are unreliable. (Tables 5.13-16)

Table 5.1. Standard Normal (Z-Scores) for State Pass Rates on the Engineering Fundamentals Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	4100	-13.85 **	4257	-15.36 **	4703	-16.74 **	4568	-15.48 **	5272	-18.26 **
H	1669	-4.38 **	1525	-4.79 **	1499	-2.80 **	1337	-1.89	1395	0.09
F	508	-5.70 **	512	-4.11 **	413	-6.67 **	483	-4.36 **	416	-2.92 **
E	1953	-4.64 **	1877	-2.51 **	1864	-2.39 *	1934	-2.32 *	1866	-3.98 **
I	998	3.73 **	901	4.12 **	876	5.03 **	924	7.26 **	910	6.23 **
J	1691	10.14 **	1517	9.35 **	1437	9.23 **	1271	13.75 **	1181	12.51 **
D	2235	-0.65	2044	2.14 *	1939	0.46	1883	2.24 *	1772	3.58 **
K	2730	8.01 **	2433	11.37 **	2408	12.46 **	2097	11.17 **	2486	16.01 **
G	926	9.90 **	855	10.07 **	777	10.88 **	525	1.70	359	9.12 **
A							731	-1.94	614	-1.02

*p<0.05 **p<0.01

Table 5.2a. Average Weighted and Unweighted Z-Scores for State Pass Rates on the Engineering Fundamentals Examination by Regulatory Model, 1997-2001

	Board[1]			Agency[2]			Z	Significance of Difference in pass rates[3]
	Pass Rate	Unweighted Z	Weighted Z	Pass Rate	Unweighted Z	Weighted Z		
1997	0.67	2.01 *	0.68	0.65	-5.47 **	-2.84 **	2.86	0.0021 **
1998	0.61	2.37 *	0.49	0.61	.80	0.03	0.00	0.5000
1999	0.59	2.50 *	-0.39	0.59	-.52	-0.29	0.00	0.5000
2000	0.56	4.18 **	1.88	0.54	-1.10	-2.20 *	2.50	0.0062 **
2001	0.54	4.12 **	0.91	0.55	.81	0.88	-1.25	0.1056

*p < .05 **p < .01 ***p < .001

[1]Board states include California, North Carolina, Ohio, and Texas.

[2]Agency States include Florida, Illinois, Massachusetts, New Jersey, New York and Pennsylvania.

[3]The z-test of proportions for the difference between sample proportions was used to evaluate whether the difference in pass rates in discipline-based licensing and generic states could have occurred purely by chance. The probabilities in the table describe the likelihood of obtaining the differences observed purely by chance and lead to the conclusion that the differences are not random.

Table 5.2b. Average Weighted and Unweighted Z-Scores for State Pass Rates on the Engineering Fundamentals Examination by Licensing Model, 1997-2001

	Discipline-Based Licensing[1]			Generic Licensing[2]			Z	Significance of Difference in pass rates[3]
	Pass Rate	Unweighted Z	Weighted Z	Pass Rate	Unweighted Z	Weighted Z		
1997	0.57	-13.85 ***	-13.85 ***	0.70	2.60 **	6.30 ***	-16.25	0.0000 ***
1998	0.50	-15.36 ***	-15.36 ***	0.65	3.21 **	9.73 ***	-16.67	0.0000 ***
1999	0.47	-16.74 ***	-16.74 ***	0.64	3.28 ***	10.26 ***	-18.89	0.0000 ***
2000	0.45	-8.71 ***	-15.09 ***	0.60	3.44 ***	10.68 ***	-18.75	0.0000 ***
2001	0.43	-9.64 ***	-17.61 ***	0.61	5.08 ***	14.84 ***	-22.50	0.0000 ***

*p < .05 **p < .01 ***p < .001

[1]Discipline states include California and Massachusetts.

[2] Generic States include Florida, Illinois, Massachusetts, New Jersey, New York, North Carolina, Ohio, Pennsylvania, and Texas.

[3]The z-test of proportions for the difference between sample proportions was used to evaluate whether the difference in pass rates in discipline-based licensing and generic states could have occurred purely by chance. The probabilities in the table describe the likelihood of obtaining the differences observed purely by chance and lead to the conclusion that the differences are not random.

Table 5.3. Summary of Standard Normal (Z-Scores) for California Pass Rates on All Discipline Examinations

California		1997	1998	1999	2000	2001
Civil		-**	-**	-**	-**	-**
	Transportation[1]				-**	-**
	Water Resources[1]				-*	-**
	Structural[1]				ns	ns
	Geotechnical[1]				ns	ns
	Environmental[1]				ns	ns
Mechanical		ns	ns	ns	ns	ns
	HVAC and Refrigeration[2]					-*
	Machine Design[2]					ns
	Thermal and Fluids Systems[2]					ns
Electrical		-**	-**	-**	-**	ns
Chemical		ns	ns	ns	-*	ns
Control Systems		ns	ns	ns	ns	ns
Fire Protection		ns	ns	ns	ns	ns
Industrial		ns	ns	ns	ns	ns
Petroleum		ns	ns	-*	ns	ns
Metallurgical		ns	ns	ns	ns	none
Nuclear		ns	ns	ns	ns	none
Agricultural		ns	ns	ns	ns	ns
Manufacturing		ns	ns	ns	ns	ns

- indicates negative value

*p <.05 ** p<.01 ns= not significant

[1]Civil depth modules were added in 2000.

[2]Mechanical depth modules were added in 2001.

Table 5.4. Standard Normal (Z-Scores) for State pass Rates on the Civil Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	2600	-7.22 **	2853	-3.44 **	3104	-9.15 **	3753	-3.80 **	4133	-7.54 **
H	657	2.46 *	823	1.82	850	3.66 **	824	3.19 **	764	3.15 **
F	320	-1.01	349	-1.92	346	-2.50 *	379	-3.35 **	350	-2.88 **
E	776	-1.44	836	-2.29 *	773	-1.02	742	-3.64 **	704	-3.11 **
I	346	5.05 **	412	3.80 **	402	6.20 **	415	4.24 **	364	4.88 **
J	511	4.38 **	456	2.89 **	518	5.24 **	486	2.27 *	540	4.86 **
D	590	2.47 *	588	0.28	641	2.34 *	598	-1.53	606	0.13
K	395	6.49 **	520	4.51 **	551	6.84 **	655	7.41 **	595	10.75 **
A							232	4.24 **	128	4.23 **

*p<0.05 **p<0.01

Table 5.4a. Standard Normal (Z-Scores) for State Pass Rates on the Civil/ Transportation Depth Examination, 2000-2001

State	2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z
California	716	-4.06 **	1380	-6.40 **
H	149	3.81 **	259	4.38 **
F	68	-1.69	127	-1.18
E	148	0.47	253	0.29
I	101	4.49 **	166	5.79 **
J	88	1.77	173	4.00 **
D	111	2.01 *	242	1.60

*p<0.05 **p<0.01

Table 5.4b. Standard Normal (Z-Scores) for State Pass Rates on the Civil/ Water Resources Depth Examination, 2000-2001

State	2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z
California	499	-2.47 *	1299	-2.98 **
H	156	1.78	325	2.50 *
F	60	0.05	105	-1.43
E	64	0.07	148	-0.67
I	58	2.14 *	120	3.08 **
J	58	1.62	152	2.78 **
D	72	-0.37	185	1.90

*p<0.05 **p<0.01

Table 5.4c. Standard Normal (Z-Scores) for State Pass Rates on the Civil/ Structural Depth Examination, 2000-2001

State	2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z
California	358	0.15	765	-0.59
H	32	0.95	55	-0.65
F	29	-1.78	43	-0.20
E	55	-0.28	106	0.22
I	26	0.68	27	2.33 *
J	53	1.09	120	2.45 *
D	35	-0.96	94	-0.85

*p<0.05 **p<0.01

Table 5.4d. Standard Normal (Z-Scores) for State Pass Rates on the Civil/ Geotechnical Depth Examination, 2000-2001

State	2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z
California	286	-0.69	497	-0.27
H	68	3.29 **	88	2.29 *
F	22	-1.48	47	-0.28
E	87	-2.88 **	168	-2.65 **
I	33	0.52	38	0.11
J	35	1.29	75	2.17 *
D	42	0.33	57	0.41

*p<0.05 **p<0.01

Table 5.4e. Standard Normal (Z-Scores) for State Pass Rates on the Civil/ Environmental Depth Examination, 2000-2001

State	2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z
California	79	-0.26	192	1.33
H	24	0.47	37	-1.47
F	10	-0.20	28	-0.50
E	17	-0.31	29	0.17
I	6	0.89	13	1.01
J	11	0.88	20	0.19
D	9	-0.69	28	-1.70

*p<0.05 **p<0.01

Table 5.5. Standard Normal (Z-Scores) for State Pass Rates on the Mechanical Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	724	1.19	594	-0.39	517	-1.75	505	-0.29	460	-1.91
H	251	-1.76	192	-1.89	204	-0.10	169	-0.73	146	0.94
F	161	-2.62 **	139	-3.91 **	131	-4.29 **	126	-3.03 **	101	0.14
E	480	-4.07 **	386	-4.20 **	358	-3.20 **	318	-4.42 **	266	-3.55 **
I	134	0.68	144	2.11 *	138	3.38 **	113	3.21 **	97	1.93
J	266	3.22 **	219	3.64 **	227	3.40 **	177	1.14	105	-1.79
D	305	-0.21	233	0.51	234	1.50	163	1.89	199	0.50
K	235	5.62 **	208	4.92 **	166	3.23 **	201	2.77 **	182	5.17 **
A							48	1.71	33	-0.08

*p<0.05 **p<0.01

Table 5.6. Standard Normal (Z-Scores) for State Pass Rates on the Mechanical Engineering Depth Examinations, 2001

State	HVAC and Refrigeration		Machine Design		Thermal and Fluids Systems	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	118	-2.05 *	59	-1.45	79	0.01
H	35	3.14 **	17	0.27	18	-1.30
F	24	0.08	12	-0.93	14	1.61
E	73	-1.14	28	-1.42	37	-2.29 *
I	19	1.13	8	2.16 *	12	1.66
J	24	0.49	36	1.83	17	0.83
D	34	1.28	20	0.64	22	0.66

*p<0.05 **p<0.01

Table 5.7. Standard Normal (Z-Scores) for State Pass Rates on the Electrical Engineering Examinations, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	596	-3.40 **	469	-3.45 **	417	-3.60 **	430	-2.91 **	78	-0.20
H	172	0.97	154	-0.41	147	1.57	117	-1.01	140	-1.54
F	89	-0.79	90	-1.19	70	-0.60	57	-0.02	54	-1.40
E	292	-1.44	269	-2.77 **	250	-2.06 *	225	-1.42	180	-3.49 **
I	118	0.05	116	1.79	86	1.83	78	2.38 *	81	0.70
J	167	2.25 *	175	3.94 **	142	2.43 *	130	2.71 **	112	1.28
D	187	2.22 *	150	0.85	125	2.46 *	131	0.46	99	1.33
K	120	4.61 **	136	4.30 **	93	3.22 **	110	2.23 *	75	3.89 **
A							40	1.05	19	0.94

*p<0.05 **p<0.01

Table 5.8. Standard Normal (Z-Scores) for State Pass Rates on the Chemical Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	131	-1.42	91	-1.12	88	1.09	76	-2.24 *	66	-0.41
H	30	-2.07 *	22	-0.57	21	-1.25	11	0.16	16	-0.58
F	45	-0.27	36	-2.08 *	35	-1.27	34	-3.33 **	33	-1.33
E	53	-1.19	53	-1.02	45	-2.39 *	27	-0.24	20	-3.22 **
I	30	1.26	23	1.07	22	0.33	15	0.81	19	0.60
J	35	0.79	53	0.15	38	0.67	30	2.62 **	20	0.81
D	40	1.03	31	-0.09	32	-0.16	28	0.75	21	-0.75
K	58	2.84 **	56	3.55 **	26	2.81 **	36	2.87 **	41	2.84 **
A							3	1.99 *	5	2.19 *

*p<0.05 **p<0.01

Table 5.9. Standard Normal (Z-Scores) for State Pass Rates on the Control Systems Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	23	-1.62	15	-0.42	17	-0.72	9	-1.53	20	-1.40
H	7	-0.38	3	-2.39 *	3	-1.14	7	-0.35	15	-0.20
F										
E	3	-1.11	3	0.76	2	0.52	7	0.55	11	-0.02
I	8	0.65	8	1.23	4	0.74	6	1.34	17	1.93
J	8	1.38	6	-3.39 **	11	0.30	12	-0.85	20	-0.23
D	12	0.19	13	0.82	8	1.04	7	1.45	13	0.97
K	22	0.85	13	1.57	12	-0.50	11	-1.26	5	-1.28
A							2	0.77	1	0.47

*p<0.05 **p<0.01

Table 5.10. Standard Normal (Z-Scores) for State Pass Rates on the Fire Protection Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	28	-0.23	37	1.56	34	1.72	28	0.07	28	-1.11
H	5	-0.22	6	-0.53	6	-0.67	7	-0.81	11	-1.17
F										
E	6	-1.40	6	-2.17 *	6	-1.49	10	-1.97 *	12	-1.33
I	2	0.14	4	-0.77	6	0.15	2	-0.88	8	1.63
J	3	-0.41	4	0.24	2	-1.33	5	0.60	7	1.23
D	6	1.07	5	-1.08	10	-1.71	8	1.39	2	0.44
K	5	1.57	4	0.24	6	0.97	6	-0.60	6	0.77
A							8	2.20 *	9	1.29

*p<0.05 **p<0.01

Table 5.11. Standard Normal (Z-Scores) for State Pass Rates on the Industrial Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	11	-1.31	10	-1.46	7	-1.29	6	-1.83	9	-1.18
H	6	0.15	8	0.54	3	0.47	7	1.68	5	0.35
F										
E	1	1.06	2	-0.09	2	1.33	2	1.31	1	0.61
I	4	-0.88	6	0.67	5	-0.58	7	-0.59	2	-0.73
J	12	1.37	10	0.44	10	1.08	4	0.84	8	0.13
D	6	0.15	9	0.82	4	-0.12	2	-0.11	1	0.61
K	5	-0.31	8	-0.88	5	-0.58	6	-0.20	4	1.22
A							1	-1.08		

*p<0.05 **p<0.01

Table 5.12. Standard Normal (Z-Scores) for State Pass Rates on the Petroleum Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	19	0.04	17	-0.66	16	-2.58 *	13	-1.34	8	-1.41
H	1	-1.46			1	-1.02				
F										
E										
I					1	-1.02	1	0.75		
J	1	-1.46			1	0.98	1	-1.33	3	-1.73
D	5	1.53	1	-1.11			3	0.10		
K	31	-0.04	22	0.81	24	2.35 *	15	1.29	17	1.70
A										

*p<0.05 **p<0.01

Table 5.13. Standard Normal (Z-Scores) for State Pass Rates on the Metallurgical Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	6	-0.30	5	-0.47	4	0.59	3	0.64		
H	4	1.77	2	0.55			1	0.37		
F										
E							1	0.37	1	0.00
I	3	-0.79	3	-1.05	1	-3.39 **			1	0.00
J	5	-0.72	5	-0.47	2	0.42	2	-1.65	1	0.00
D	1	0.89	4	0.77	4	0.59	1	0.37		
K	6	-0.30	4	0.77	2	0.42				
A										

*p<0.05 **p<0.01

Table 5.14. Standard Normal (Z-Scores) For State Pass Rates on the Nuclear Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	2	-1.15	2	0.86	1	0.37	1	0.37		
H	1	-0.82	2	-0.73	1	0.37	1	0.37		
F										
E										
I	4	0.41	6	-0.35	2	-1.65	2	-1.65	6	0.90
J	1	-0.82			1	0.37	1	0.37	1	-2.71
D	6	1.33	4	1.22	1	0.37	1	0.37	1	0.37
K	1	-0.82	1	-1.64	2	0.52	2	0.52		
A										

*p<0.05 **p<0.01

Table 5.15. Standard Normal (Z-Scores) for State Pass Rates on the Agricultural Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	3	0.10	1	-1.00	1	-1.36	2	-1.11	3	-0.34
H	2	1.06	3	-0.58	7	-1.23	4	0.49	1	-0.87
F										
E							1	-0.78		
I	1	-1.33	6	0.82	9	2.20 *	3	-0.17	3	0.83
J	2	1.06	3	1.73	2	1.04	1	-0.78	3	0.83
D	1	-1.33	2	-1.41	2	-0.44	2	0.35	1	1.15
K	5	-0.19	5	-0.45	5	-1.17	3	1.03	3	-1.50
A										

*p<0.05 **p<0.01

Table 5.16. Standard Normal (Z-Scores) for State Pass Rates on the Manufacturing Engineering Examination, 1997-2001

State	1997		1998		1999		2000		2001	
	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z	Number Taking Exam	Z
California	2	0.00	3	-0.58	3	0.69	2	-0.17	3	-0.25
H					1	-0.47	1	0.89		
F										
E			2	-0.47	3	-0.81	2	-1.60	1	-1.64
I	1	-1.00	2	-0.47					3	-0.25
J	4	1.00	1	-0.33	3	0.69			3	1.05
D	1	-1.00			1	-0.47	2	1.25		
K			2	1.89			2	-0.17	1	0.61
A										

*p<0.05 **p<0.01